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Assessing the Competitiveness of International Financial Services in Particular Locations: A Survey of Methods and Perspectives

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Abstract

The International Financial Services (IFS) industry is restructuring internally and by location. This paper outlines the economic forces and analytical methods that may be applied to examine the economic drivers of these processes as ever more cities, particularly in East Asia, are vying to attract IFS providers and their clients. The ICT revolution has made those IFS that can be commoditized footloose in search of cost efficiency. High value-added financial services, however, will continue to be developed and coordinated in a few major IFS centers that have invested in, or capitalized on, regional or global advantages for themselves and their clients. The resulting pattern of functional fragmentation and geographic dispersal may facilitate analyses of the competitiveness of different lines of the financial services business in a particular location by methods such as Data Envelopment and Stochastic Frontier Analysis. These forms of comparative efficiency analysis have recently been questioned and their results reinterpreted.

Key words: offshore centers, international financial services, financial-business location, efficiency of financial services, data envelopment analysis, stochastic frontier analysis

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I. Introduction

International financial services (IFS) is big business not just for some very small but functional offshore financial centers (OFCs).[1] Kaufman (2001, p. 366) cites an estimate that 7 percent of British GDP around 1998 was brought forth within one square mile of what is know as "the city" by 1 million employees, indirect employment included.[2] In Luxembourg, financial services in 2003 accounted for 30 percent of gross value added[3] not counting ancillary services such as legal, accounting and tourism. The percentages for Hong Kong and Singapore were much smaller.[4] Still there are several countries and cities of appreciable size for whom supplying international financial services is one of their most important, and often subsidized, businesses. Along the coasts of Asia and the Persian Gulf, almost all rapidly developing countries, large and small, now appear bent on growing their own international services centers. Established centers, in turn, worry about maintaining their edge.[5]

This paper outlines what is required to attract the high-value lines of the international financial services business to a particular location (Section 2) and what are the economic benefits and fiscal costs of promoting these lines (Section 3). Keeping them in place requires macroeconomic stability (Section 4) and maintaining an internationally competitive level of

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[1] Throughout we are not concerned with OFCs that are merely booking centers. Such centers provide a legal place of record for transactions that actually take place elsewhere. The heterogeneity of offshore jurisdictions by stage of financial development is obvious from the composition of the Offshore Group of Banking Supervisors: Hong Kong and Singapore are members as are Labuan, Mauritius, and Vanuatu (see BIS, 2006a, p. 61). Jao (2003) provides a comprehensive typology of financial centers.

[2] McKinsey & Co. for Bloomberg, Michael R., and Shumer, Charles E. (2007, pp. 10, 15) contains an estimate of 318,000 for London's financial services workforce, and 328,400 for New York's in 2005. It cites an estimate suggesting that every "securities" job accounts for two additional jobs in other industries. Applying a multiplier of 3 to "securities" jobs would lead back to the earlier estimate of an employment effect in London of about 1 million.

[3] For the sources see von Furstenberg (2007).

[4] Zhao, Li and Wang (2004, p. 587) report that only 2.25 percent of Shanghai's total employment was in the FIRE sector in 2000. This percentage does not include employment in government agencies associated with foreign exchange administration and trading, banking supervision, and related financial functions.

[5] For instance, a March 2007 conference on U.S. Capital Market Competitiveness, convened by the U.S. Treasury Department, called for initiatives to replace the fragmented and largely rules-based U.S. regulatory structure with a (more) unified and largely principles-based structure similar to that of the U.K. Financial Services Authority.

technical and allocative efficiency of operations (Section 5) with the cost-saving infrastructure and local amenities provided. This infrastructure may relate not only to operational assets such as communications, automated trading platforms, and international accessibility, but also to characteristics of the macroeconomic system and the quality of governance, industry institutions, and regulatory oversight. The paper then sketches how developments in ICT that affect the operation of capital markets and the need for relationship banking and finance may affect the outlook for IFS in specific locations (Section 6) and concludes (Section 7).

II. Requirements for Operation of Offshore and International Financial Service Centers

Lists of these requirements often start with libertarian criteria such as the political independence of such centers in a free-market and private-enterprise environment (see, for instance, Kaufman, 2001, p. 370). However they often depend on their Financial Services Authority or similar institution to be their facilitator and promoter, rather than a mere arms-length supervisor. Indeed OFCs and International Financial Service Centers (IFSCs) often have been planned as part of an industrial development policy by national or subnational units of government. Zhang (2003) provides a vivid account of the strong and quite visible hand of government in particular with regard to Shanghai's Pudong New Area Liujiazui development.[6] For three or four decades after 1949, Shanghai had actually been penalized, rather than favored, by the central government.[7] Hence the private enterprises engaged in international financial business are not always far removed from their host government, and principled libertarianism is not what such centers

[6] Similarly the Government of Hong Kong, GHK (2007, p. 50 (4.20), and p. 47 (4.11)) calls for "central government authorities to adopt a proactive policy to facilitate the use of Hong Kong's financial system for Mainland's international financial activities."

[7] During this time as little as 13 percent of the Shanghai's revenue was left in the city rather than remitted to the central government, while local retention averaged 30 percent elsewhere, including Beijing (see Lai, 2006, p. 4).

generally seek or practice. Rather, they want the government to get out of the way and have its ear all the same.

There are, however, a number of fairly universal prerequisites for OFC/IFSC success that have been enumerated by Kaufman (2001), Jao (2003), Park, Ito and Wang (2005), and others. In Table 1 these are assembled, condensed, and then organized by me into macroeconomic prerequisites, infrastructure and human-capital requirements, and industry prerequisites. Not all of these prerequisites are immediately persuasive. Why, for instance, should stable exchange rates and low inflation be a "requirement" under A-3 when offshore centers do not operate in a minor local currency anyway? The answer is that these macroeconomic conditions are relevant to banking soundness, the depth of the domestic financial system (see Hausmann *et al*., 2000), and the credibility of the host government and all its undertakings. Also, each of the main criteria listed in Table 1 usefully could be expanded. For instance, point C-1 of Table 1 relates to the availability of well-motivated and sophisticated bank supervisors. The 25 *Core Principles for Effective Banking Supervision* promulgated by the BIS (2006b) might then be referenced to spell out what sophisticated supervisors are to accomplish. Such instructive detail aside, the message is that roundly failing to meet just a few of the main criteria listed in Table 1 may be fatal to countries' getting or keeping legitimate IFS business.

III. Economic Benefits and Fiscal Costs of Hosting an IFSC

How hard countries or jurisdictions should fight to attract international financial services business obviously depends on the benefits to be expected from success in the endeavor. Yet there are few studies of whether having an IFSC adds to an economy's rate of growth and to the living standards of its people, all considered. There is also little or no quantitative work on the

Table 1: Requirements for Successful OFCs and IFSCs

A. Macroeconomic Prerequisites

A-1. Free international capital flows with all (for IFSCs), or at least special zones (for OFCs), of a country, and remote access from and to its foreign suppliers and clients
A-2. Absence of domestic interest rate controls to allow financial-product development
A-3. Stable exchange rates, low inflation, and freedom of currency substitution
A-4. Fiscal-system and sovereign-debt sustainability
A-5. Domestic tranquility, labor peace, and low levels of crime, fraud, and corruption and of business in furtherance of financial and other crimes or tax evasion

B. Physical and Institutional Infrastructure Requirements

B-1. Excellent ICT, transportation, and amenities systems and public provision of accurate financial information and ratings; appropriate use of privacy safeguards
B-2. Advanced listing and exchange systems, efficient OTC and organized-exchange trading platforms and/or trading privileges on foreign exchanges
B-3. Efficient settlement procedures for payments and for trades in stock, bond, and derivatives markets that are up to international standards
B-4. A strong legal system, including property rights, contract enforcement, functioning court system, bankruptcy processes, and international accounting and auditing rules

C. Ability to Meet Human Capital Requirements

C-1. Availability of well-motivated and sophisticated bankers and their regulators/ supervisors and of analytical and managerial support staff critical for financial services
C-2. A favorable living environment and free entry for expatriates employed in the financial-service sector, -- conditions that lower the cost of imported talent
C-3. A large talent pool and widespread competence in English
C-4. A tradition of professionalism and honesty in the host country or jurisdiction

D. Industry Prerequisites

D-1. Economically strong and credible financial institutions with free foreign entry
D-2. A large complement of other financial businesses and of those who serve them
D-3. Minimum bank and securities regulation except prudential
D-4. A critical mass of financial activity to achieve economies of scale and scope
D-5. A high degree of efficiency by international standards in financial trading and engineering, intermediation and settlements, risk transformation, and underwriting

optimal degree of integration of offshore and onshore operations and on the links to be encouraged between them at various stages of development.

Regarding the fiscal costs of IFS, the list of government measures to establish and grow IFSCs is long and varied. The general practice is to tax very sparingly, if at all, income earned from international financial service business either by those conducting it or by nonresident entities financing it through their deposits, investments, and loans. For instance, withholding taxes are generally not imposed on the interest income of such entities. Outright discrimination in favor of offshore over onshore activities is common and pervasive as, for instance, when the tax on bank profits from the Asian-Currency Unit (ACU), but not the Domestic-Banking Unit (DBU) of Singapore banks was cut from 40 to 10 percent in 1970 (Jin, 2005, p. 211). Such discrimination is also involved when expatriates employed in the international financial service business receive generous tax-free allowances in Hong Kong, or when those who have been accorded "enhanced fund manager" status in Singapore enjoy a complete tax holiday on fee income from providing investment management and advisory services to foreign investors (Jin, 2005, p. 222). Where there are value-added taxes as in Ireland, the international financial business may be exempt. Direct and indirect fiscal subsidies that provide cost savings and in-kind benefits to the IFS industry are common. These may take the form of government expenditures on IFS-friendly regulation, training, and construction of infrastructure to provide pertinent facilities and services.

Pump-priming of lines of the financial business that are to be drawn to a particular location is also common. The Monetary Authority of Singapore and the Government of Singapore Investment Corporation, for instance, have placed $35 billion with managers in the private sector to encourage the growth of the fund management industry (Park, Ito and Wang,

2005, p. 9). In addition, the government provides almost one fifth of the venture capital funding made available in Singapore, and there is preferential tax treatment for capital gains that are particularly important for the venture-capital industry (Jin, 2005, pp. 225-226).

Another tax expenditure is due to the loss of seignorage that is associated with currency substitution being facilitated by the operation of OFCs in countries that do not have a domestic currency of international standing. In Hong Kong, for instanced, over 50 percent of banking business has been in foreign currency denominations, mostly USD (Huang, 2005, p. 195).[8] Thus risk reduction through internationalization and currency substitution has tended to shrink the relative size of the domestic-currency component of the financial sector of financially open countries with minor currencies (see Bossone, Honohan, and Long, 2002, p. 120). The size of the inflation tax base is diminished and the disincentive to inflate is strengthened by (the threat of) currency substitution.

Considering tax preferences, subsidies, lower seignorage revenue, and government industry-development expenditures together, IFSCs and OFCs are not likely to make a direct positive fiscal contribution to the countries that compete for them by market and nonmarket means. Rather they are associated with a narrowing of the tax base toward non-traded goods and immobile factors. Such a tax structure may or may not be justified under the inverse-elasticity rule of optimal taxation or under international trade rules against competition-distorting government subsidies. Hence the extra economic benefits of growing IFSCs rather than some other business would have to be sufficient to compensate for the extra fiscal costs. Only the location choices for the commoditized parts of the IFS business appear increasingly to conform

[8] Since 2006, growing amounts of liquid funds and currency obtained from RMB deposits at banks in Hong Kong have tended to be "returned" to the Mainland through the issuance in the Hong Kong market of RMB-denominated bonds by official and some private borrowers from the Mainland. Yet use of the RMB in Hong Kong has spread.

to the economic laws of global competition and cost efficiency without much depending on government promotion, subsidies, and industrial planning.

IV. Macro-Level Efficiency Criteria for IFSCs

Two aspects of efficiency of the financial system, macro and micro, are commonly distinguished. Macro-level efficiency relates to the efficient transfer between surplus and deficit units -- or lenders and borrowers, savers and investors -- both within and between countries at low cost and with minimal risk of a major financial crisis. As Denizer, Dinc, and Tarimcilar (2007, p.192) note, adverse environmental factors, such as a high degree of volatility in inflation and growth rates, detract from banking efficiency, and the effectiveness of financial reforms depends on a stable macroeconomic environment. An IFSC's contribution to the macroeconomic efficiency of its host country or jurisdiction can come through two channels. The IFSC may contribute to growth and stability first through its influence on the choice of the tax, currency, and exchange-rate regimes as discussed in von Furstenberg (2007), and secondly through changing the correlation of its jurisdiction's business cycle with the world business cycle. For instance, Hong Kong, which has maintained a fixed exchange rate with USD since 1983, has a high exposure to world-economy shocks represented by the United States (see Genberg, 2005, p. 22), and the influence of its financial channels to the world is stabilizing. The reason is that U.S. real interest rates, that impact Hong Kong's, have moved in a manner consistent with an active application of the Taylor rule for at least two decades, thereby providing countercyclical-policy benefits for Hong Kong as well. By contrast, Cheung, Tam, and Yiu (2006, p. 11) found "no substantial evidence that the Chinese interest rate is driven by the U.S. rate" in spite of the RMB's tight peg to USD over most of their sample period from February 1996 to April 2006.

1. Risk Assessment

If there is a substantial leakage of funds raised from nonresidents into the domestic financial system, known as *out-in* by its sources (nonresident = out) and uses (resident = in), the regulatory and reserve standards applied onshore will in fact be no higher than those applied offshore. Because of this leakage, currency-denomination and maturity mismatches may intensify, and domestic monetary policy may be undermined. Kaufman (2000, p. 6) relates that fully 60 percent of the $50 billion in loans made by the ostensibly "offshore" Bangkok International Banking Facility (BIBF) in the year before the East-Asian crisis that started in 1997 were "out-in" transactions used to finance domestic firms. Especially when there is a strong expectation that exchange rate fluctuations with USD will continue to be small, maturity mismatches and carry trades of borrowing cheaply in major foreign currencies to lend at much higher interest rates in local currencies may be encouraged. As the 1997-98 East-Asian troubles showed, a deep crisis ensues when such fair-weather strategies come to grief and end up disrupting much of the financial intermediation system that is critical to economic vitality.

Fragility may also have been raised by offshore operations because banks that operate in branch form in the offshore sector may not be required to hold capital and hence are not subject to minimum capital adequacy requirements or to capital-based limits on large exposures (Huang, 2005, p. 204). Add the increased probability of supervision failures in complex networks of financial relationships and the result is that "some offshore centers have magnified any financial problems in their countries" (Kaufman, 2000, p. 6).

If a substantial leakage develops in the opposite direction, *in-out*, there may be sudden credit contraction and asset deflation associated with capital flight. It appears that business-cycle synchronization among Asian countries in the 1990s can at least partially be explained by

synchronization of net capital flows and the ensuing boom-bust cycles after financial market liberalization (Park, Ito, and Wang, 2005, p. 5).

2. Policy Obstacles to Financial Development

IFSCs can function as market makers for their region's securities to the world. Conversely they also can provide risk reduction through internationalization of the portfolios of domestic investors. However, capital controls may transform diversifiable into non-diversifiable risk for the residents of the area under such controls. Indeed the Mainland stock markets present a high level of, otherwise diversifiable, risk. Jeon, Oh, and Yang (2006, p. 85) have estimated that the Shanghai and Shenzhen markets have been the least correlated with other stock exchanges, in particular the U.S. market (correlation coefficient 0.019), while the Hong Kong market has been the most correlated (0.594) with the United States among 10 East Asian markets in their study. This suggests that there is much more idiosyncratic noise in the Mainland than in the Hong-Kong China market. To the extent capital controls continue to hamper international portfolio diversification in the Mainland in spite of the progressive expansion of quotas to invest in foreign exposure under the Qualified Domestic Institutional Investor (QDII) scheme, the globally non-systematic part of the volatility of China's stock market, like its political risk, is non-diversifiable for its residents.

Domestic interest-rate controls, such as maximum deposit and minimum lending rates in Mainland China, and official credit guidance long have stunted the development of the RMB loan and bond markets (see HKIMR/BIS/CEPR, 2006). Liu and Yang (2005) thus had noted an "underlending syndrome"on the Mainland. Furthermore, market-based yield curves suitable for national and international financial instruments and for the construction of derivatives have

remained incomplete. Derivatives need such yield curves for information, pricing, arbitrage, and product development. They also need interest rates on RMB-denominated instruments that are determined freely in international financial markets. Lacking that, internationally hedged interest parity has been grossly violated (Ma and McCauley, 2008), as the pricing of RMB/USD NDFs has not been tied down by arbitrage. However, underlying conditions have started to change in these respects, with forward exchange rates built on Shibor, the Shanghai interbank offered rate, and its yield curve up to one year, becoming available in early 2007.

V. Microeconomic Efficiency Measures for IFSCs

Measuring the efficiency of the financial service industry and its different lines of business presents special challenges. As Welch (2006) explained, the simple accounting approach, of using cost-of-funds to gross-income ratios as an inverse indicator of efficiency, has severe problems. The reason is that profitable financial services that are fee intensive inherently are cost intensive as well. Performance-related pay and option values for lead executives also may drive up the accounting measure of costs together with firm income.[9] Hence cost/income ratios tend to be elevated for high-value added services.

Major providers of international financial services are multi-product firms. The allocation of costs that is required to establish the profitability of each product is difficult because many of them utilize common facilities of the firm. Cost and value attribution are even more complicated because many of the financial products of the firm potentially are in joint demand by its

[9] Kaplan and Rauh (2007, p. 37) estimate that individuals they characterize as Wall Street professionals comprise a greater fraction of the top end of the income distribution that the top five executives of "Main Street" public companies. They also report (p. 3) that, in 2004, nine times as many Wall Street investors (e.g., hedge fund managers) earned in excess of $100 million as public-company CEOs. They examine whether these elevated incomes are the result of performance, quasi-rents, or even "theft" and conclude that theories of skill-based technological change, greater scale, and superstars, in some combination, provide the most plausible explanation.

customers and also function as service inputs to some of its outputs. Nevertheless progressive commoditization and outsourcing of sub-functions have facilitated the accurate pricing of those functions that are performed not only in-house but also by specialized suppliers and monolines which price them directly in the market. Thus the fragmentation that has reached the international financial service business is both enabling, and creating pressure for, more precise cost and profit accounting for a range of functions.

The price of functions that can be commoditized has been declining sharply (see, for instance, Jones, 2002) relative to that of actively managed and custom-tailored functions. Hence discussion of costs and benefits of advanced IFSCs increasingly relates to upper-level service functions displaying heterogeneity of supply and demand: They are performed subject to negotiated remuneration schemes and economic-rent sharing arrangements for their top executives and demanded by high-net-worth individuals and institutional investors requiring individual attention. In private banking, for instance, an accepted premise is that wealth management is not about selling products, not even the firm's own products, but about advice.

1. Data Envelopment Analysis and X-Inefficiency

The development and introduction of new products is subject to financial-engineering and market-acceptance risk. But once the profitability of new products has been established, there will be pressure on financial service providers to introduce and offer them equally elsewhere, and the technology of creating and managing these products will be diffused. Nevertheless, at any one time, there can be significant differences in the types of financial services offered in a particular location, and there may be productivity differences between locations in performing the same types of services. If efficiency leaders can be identified that can be taken to represent

the technical efficiency frontier, there may be useful comparative measures of the degree to which other firms, or groups of firms, in a particular location fall short of this frontier.

One such measure may be obtained with Data Envelopment Analysis (DEA). DEA is a nonparametric "extreme-point" method used in operations research for the estimation of efficiency frontiers for multiple outputs produced with given inputs. This method assumes that efficiency measures are free from random disturbances and places little structure on the piecewise linear best-practice frontier that results (Carbó Valverde, Humphrey, and López del Paso, 2007a, p. 211).[10] Casu and Girardone (2006), among others, provide an application to banks. Given this efficient set and an assumption of linear returns to scale, inefficient producers are defined by the percent, less than 100, of the radial distance to the frontier which they achieve. For instance, if the score of a producer, known as a decision-making unit (DMU), is 0.68 on a scale of 0 to 1, the implication is that the most efficient corresponding "virtual" producer (a linear combination of efficient producers producing the same output mix as the inefficient producer) could achieve the same output combination efficiently by using only 68 percent as much of each and every resource as the inefficient producer.

If the efficiency level of the leaders in principle is available to all industry participants wherever they may be located *and* inefficiency is assumed to arise from less output being produced with given inputs, this shortfall now is known as the degree of *X-inefficiency* as Altunbas and Chakravarty (1998) explain. This definition of X-efficiency as the effectiveness with which an organization uses its given set of inputs to produce outputs fits the DEA method but is narrower than that of Leibenstein (1966), who introduced the concept, because it focuses just on what is called technical efficiency below. The term X-inefficiency originally was used for

[10] In practice, these authors (p. 217) and others (see Chen, 2002) have relaxed the assumption that random error is zero by constructing bootstrapped confidence intervals in assessing results or working with chance-constrained DEA (CCDEA) incorporating a stochastic mechanism.

operating below the production frontier for any number of not separately measured ("X") reasons that could be managerial or motivational. Leibenstein's definition of allocative inefficiency as being at a socially inefficient point on the production frontier on account of, say, monopoly or tariffs also differs from the definition below in that it deals with the non-optimality of the output or input mix from a social-welfare, rather than private-profit, perspective. The latter perspective, adopted in current literature, focuses on reasons for outcomes that fail to maximize firm profits under prevailing opportunities and external constraints. It takes output and input prices as given to the firm and does not deal with the social welfare costs of any distortions of these prices.

X-inefficiency in the broadest sense may be decomposed and characterized as follows:

(1) The level of the best production and distribution technology that is available in a particular location or industry setting unavoidably may lag behind that of the global industry leaders,

(2) the efficiency of global leaders and others may be subject to random influences and errors of measurement, and with few exceptions (see Chen, 2002), random errors are not identified and taken out under the distribution-free DEA and other frontier-fitting methods,

(3) the mix by lines of business and their quality, scale, and marketing may not be optimal for a given DMU, but a DMU's efficiency is defined for whatever combination of outputs it produces,

(4) the given mix of inputs -- including management, operations and procedures -- used in any or all of the lines of business may not be optimal, and

(5) X-efficiency analysis is designed to measure the degree of inefficiency, not its sources.

Point (1) often is taken to refer to comparative *technical* efficiency as it measures location-specific differences in total factor productivity relative to an observed national or global maximum, while points (3) and (4) are aspects of *allocative* efficiency within the local technical efficiency frontier. Under certain conditions the two efficiency indexes are multiplicative (see

Chen, Skully, and Brown, 2005, p. 237). For instance, if the level (1) score is 0.9 and (3) and (4) together are scored 0.8, a particular IFSC or local establishment would have a total efficiency score of 0.72. Attempting to make the distinction may be of some value: Moving up in the global comparative technical efficiency ratings could well require major and coordinated investments in the development of new human and physical resources, processes, infrastructures, and technical capabilities. Improving allocative efficiency so as to move closer to the profit maximizing point on the *local* technology frontier normally is quicker, cheaper, and easier to organize than to shift out that frontier. In addition, the degree of allocative efficiency can in good part be improved by local establishments acting on their own, while a major push to raise the level of technology, and hence the degree of technical efficiency, may be largely out of their hands.

2. Stochastic Frontier Analysis

This form of analysis with the measures of production, cost, revenue, and profit efficiency it can yield, provides an alternative method of efficiency analysis of firms that produce multiple outputs with a variety of inputs. This parametric method improves upon the previous method principally in regard to point (2) by estimating the production function representing the maximum output that is achievable with given technology from a bundle of inputs with due allowance for statistical noise. Furthermore, by being explicit about the input-output relationship, defects (3), (4), and (5) are alleviated more easily than under the DEA method. At the same time, advance information requirements about the form of the multi-product production function are demanding.

A small amount of notation, taken from Bandyopadhyay and Das (2006, p. 167), may be useful to characterize how stochastic frontier analysis, SFA, separates uncontrollable error

representing statistical noise and controllable error representing technical or allocative inefficiency. For the i^{th} of n firms, that model can be written:

$$y_i = f(x_i, \beta) + \varepsilon_i, \qquad where\ \varepsilon_i = v_i - u_i, \qquad and\ u_i \geq 0. \tag{1}$$

Here y_i is the output of the i^{th} firm, x_i the vector of non-stochastic inputs, ε_i the random error associated with y_i, and β is a vector of unknown parameters of the production function f(.). The random error ε_i is composed of two unobservable stochastic terms, v_i the statistical noise and u_i the *inefficiency error*. Since $u_i \geq 0$, $y_i \leq f^s_i(x_i, \beta)$, where $f^s_i(x_i, \beta) = f(x_i, \beta) + v_i$ represents the maximum possible output and is known as the stochastic production frontier of the i^{th} firm. In the simplest case, the component errors v_i and u_i can be represented as independently distributed normals, but with u_i being truncated from below at 0.[11] As equation (1) would be estimated in logarithmic form, u_i would be the exponential inefficiency rate so that $\exp(-u_i) \leq 1$ could be comparable to the relative efficiency rate described earlier for the DEA method.

A comprehensive treatment of the stochastic frontier model, its econometric estimation and the decomposition into inefficiency measures, has been provided by Kumbhakar and Lovell (2003). The authors start with input-oriented and output-oriented concepts of *technical* efficiency that refer to the minimum combination of inputs required to produce given outputs or the maximum combination of outputs obtainable from given inputs, respectively. The results for technical inefficiency are dual measures of the relative radial distance to the relevant minimum input or maximum output frontier using isoquants as standards (p. 44). The authors point out that

[11] Alternative distributional assumptions have been imposed on the inefficiencies and random error in order to disentangle the two. Among them are the thick frontier approach (TFA) and the distribution-free approach (DFA). For a fuller exposition and a check for the methodological robustness of the efficiency scores and rankings obtained with the four different approaches, including DEA and SFA, see Bauer, Berger, Ferrier and Humphrey (1998).

these measures are numerically equivalent only if the technology is characterized by constant returns to scale (p. 46) and that more discerning measures, that are not based on proportional variations of all inputs or outputs, have been proposed in the literature but rarely applied (p. 44). They note that in any event economic significance is limited because the degree of technical inefficiency is established without reference to a given set of relative prices of inputs and outputs and because no behavioral objective, such as profit maximization, is yet imposed.

Hence from an economic perspective, factor and product price and cost features and rate-of-return objectives need to be added. Cost minimization requires input-oriented technical efficiency and allocative efficiency to avoid both excessive input use and a non-optimal input mix. Revenue maximization requires the avoidance of output-oriented technical inefficiency (due to not producing as much output as possible with given inputs) and of an inappropriate output mix. Finally, profit maximization requires technical efficiency as well as input-allocative and output-allocative efficiency, as well as operating at the right scale in achieving these efficiencies (Kumbhakar and Lovell, 2003, pp. 50-60). All these different efficiency measures, whose precise relation to each other is explored just below, may be appropriate objectives within the limited sphere of particular agents' responsibility but only the last measure, profit efficiency, provides a comprehensive measure that is often equated with economic efficiency.

The degree of Profit Efficiency (PE) is measured by actual revenue minus cost divided by maximum profit just as Revenue Efficiency (RE) is measured by actual revenue divided by the maximum revenue that can be obtained by use of the firm's given set of inputs. Cost Efficiency (CE), however, is measured by the ratio of the minimum cost of producing a given output vector to observed, i.e., actual, cost. Hence, both RE and CE are measured such that $0 \leq RE \geq 1$ and $0 \leq CE \geq 1$. After cancelling Maximum Revenue, PE may be decomposed into RE minus x times the

inverse of CE, all divided by 1-x, where x<1 is the ratio of Minimum Cost to Maximum Revenue:

$$PE = [RE - x(CE)^{-1}] / (1-x). \quad (2)$$

Unlike the measures of RE and CE, the measure of PE is bounded from below by zero only if both maximum and actual profits are positive. Only the first requirement, that minimum costs are less than maximum revenue so that x<1 is likely to be non-restrictive for the vast majority of economic applications. Actual profits divided by Maximum Revenue, in the numerator of the expression for PE in equation (2), on the other hand, may at times be negative. In that case attention may be directed to the values of RE and CE and their technical and allocative inefficiency components that contribute to this negative outcome.

Of course when input and output configurations can not be changed rapidly in response to unexpected developments except at great cost, occasionally realizing losses may be part of a sustainable dynamic business strategy. Accounting measures of profit efficiency, except in simple peer-group comparisons assuming *ceteris paribus*, may only be inputs for further analysis focusing on their relation to asset value, and hence on the real options and risk diversification strategies underpinning the time profile and present value of discounted cash flow.

3. Applications to Measuring Microeconomic Efficiency

For management and policy purposes it is often necessary to analyze and decompose readings from several measures of efficiency because efficiency comparisons based on a single criterion may be misleading. Denizer, Dinc, and Tarimcilar (2007, p. 181) provide a good example when

they reject measures of intermediation efficiency for state-owned and privately-owned banks as insufficient by themselves. They report finding no difference in the efficiency with which deposit inputs were linked to loan outputs by the two groups, a result they called "unexpected."[12] They note that if they had been able to adjust the measure of loan output for the loss of (non-performing) loan value from "political" lending by state-owned banks, the result could have been very different. Jao, Jiang, Feng and Willenbockel (2007, pp. 638-640) even find that the Big Four Chinese banks, which were still state-owned during their sample period, had slightly *higher* technical efficiency than joint-stock banks, while being less efficient in other respects, in part due to government-directed lending. Shi, Zhang and Liu (2007, pp. 17-18) since have shown that the way in which political-economy considerations enter into performance measures for banks is quite complex, at least in China. When they use 10 financial ratios available to them for different classes of banks to extract four principal components including one that appears to reflect liquidity, they advise caution. High liquidity, they explain (p. 21), may be associated with a bank's low efficiency in asset utilization -- say for government bonds rather than loans to business -- making is necessary to also consult other indicators of prudent risk exposure and capital profitability.

Blommestein and Santiso (2007) similarly emphasize that cost-effectiveness should not be the sole decision criterion when public-debt managers assess which instruments to issue -- unindexed or variously indexed, and potentially denominated in foreign currency at different maturities. Rather the government's entire asset and liability profile is to be managed with an eye also to providing for macroeconomic shock absorption, i.e., consumption smoothing coupled with debt sustainability.

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[12] Claessens and Glaessner (1998, p. 30) report a similar dissonance for insurance companies in South Korea: They appeared remarkably cost-efficient but many of them were technically insolvent.

As noted previously, a basic, but empirically difficult, set of distinctions is between technical and allocative efficiencies as recently reviewed in Brissimis, Delis, and Tsionas (2006). While it has been estimated that banks in Europe on average would gain about as much from better allocation of inputs (16%) as from reaching the highest available standard of efficiency (18%), the three co-authors (2006, pp. 19-20) note that the use of individual inputs for particular bundles of financial services is still too little investigated.

A study by Kwan (2006) found a total cost inefficiency of 16-30 percent for the banking sector in Hong Kong 1992-99, similar to the average inefficiency level of U.S. and European banks relative to their respective champions, while Fu and Heffernan (2007) estimated a degree of inefficiency of 40-60 percent for banks on the Mainland for 1985-2002. The implications are that differences in the degree of inefficiency between banks, which may be state-owned and subsidized or private and competitive, and the average size of these inefficiencies are much greater in Mainland China than in Hong Kong SAR or other world-class financial centers, in part due to deficiencies of competition policy and incomplete privatizations in the Mainland.

Measures such as these recently have been reconsidered in part because they move so little over time as to appear beyond correction. The fundamental reconsideration called for in Carbó Valverde, Humphrey, and López del Paso (2007a, 2007b) thus questions the significance of broad inefficiency measures for management and operations. These authors note that if the average cost of inefficiency in various nations' banking industries keeps being estimated at 20-25% as Berger and Humphrey (1997) had reported in their far-reaching survey, the average bank could more than double its net return on assets (assuming realistically that net income is around 17% of total costs) by restructuring operations to look like those banks that appear to be most efficient. If so, the incentives to restructure should be overwhelming. However, the average

levels of measured inefficiency do not seem to be consistently falling over time for any of the numerous countries that have been studied. Hence the three authors ask whether measures of inefficiency are (a) overstated and incentives to improve that much weaker or (b) measured correctly but attributable to factors that lie largely beyond the effective control of management. They conclude from a study of Spanish savings and commercial banks (2007a, p. 216):

"By achieving efficiency levels of over 0.99 for interest costs and from 0.94 to 0.96 for operational expenses, it is clear that banks do not actually misuse 20-25% of their resources." Some of the productivity differences may be intentional and not reflect a missed opportunity to reduce costs. For instance, "many banks will purposefully hire more workers per branch office and/or provide what seem to be 'too many' ATMs and standard branch offices as part of a competitive strategy to be more accessible and to provide more convenient services." Hence only 1-5 percentage points of the 20-25% cost inefficiency may be unexplained or represent a kind of X-inefficiency that could potentially benefit from corrective action by management.

A more recent study by the same three authors (2007b) for a broader set of European banks similarly found that country-specific differences in the business environment that are largely out of the hands of banks explain a larger portion of the cross-country efficiency differences than is usually the case with standard analyses that focus only on bank-specific cost conditions.[13] By reducing the scope for *unmeasured* environmental variations, this careful work moves the debate on from the stalemate implied by the justified doubts earlier expressed by Berger (2007, pp. 134-135) about using a common meta-frontier. He argued that it is unlikely that any controls for environmental differences or any methodological breakthroughs are

[13] Kwan (2002) had found that per unit bank operating costs differ systematically across Asian countries but for reasons attributable to differences in their native bank production functions rather than to differences in the degree of openness of their banking sectors.

sufficient to eliminate the possibility that measured (international) differences in efficiency are due to unmeasured environmental variations rather than actual efficiency differences.

4. Differences in Market-Quality

Certain IFSCs function as market makers for their region's securities to their citizens and to the world. Their microeconomic efficiency in performing this function has been analyzed by the liquidity, volatility, and relative absence of price anomalies or "bubbles" in their regional or national securities market. Liu and Yang (2005) have applied this approach to evaluate the microeconomic efficiency of the Shanghai market even before it became an IFSC. They gave that market low marks: Its systematic risk for Chinese is high as stocks show pronounced co-movement with a "political" factor. Price/earnings ratios are excessive, volatile, and bubble-prone in their view. They also find positive excess returns for small firms, a finding familiar from a "priced factor" in advanced markets. On the other hand, bid-ask spreads are low in Shanghai compared with Hong Kong where the stock broking industry is cartelized. Except for the low spreads, these factors are not propitious for growing an offshore market in Shanghai.

VI. The Outlook and Future Location for OFCs and IFSCs

As Tschoegl (2000, p. 9) has noted, simple considerations of the cost of labor, land, and capital tells us little about the location of financial centers. Instead, international politics, political stability, suitable domestic regulation, the development of communications and aviation networks, and good location of cities have combined to favor some places and disfavor others.

Congested cities, such as Hong Kong and Singapore, may especially welcome an environmentally clean service industry that requires only low levels of material supplies and

utility inputs and relatively little ground area or plant and heavy equipment. Furthermore, the industry's disproportionate reliance on ICT infrastructure and services and on systems for extensive training of a skilled workforce contribute to the development of quasi-public goods that can be used at very low cost by others without requiring costly investments in additional capacity. Tschoegl (2000) believes that the communications revolution that has minimized the economic significance of distance or *space* has not equally diminished the importance of *place*. Clark (2002) cites scale economies and product complementarities combined with a distinctive regulatory heritage and the interaction between market liquidity and the scope of products offered as keeping the financial business tied to the ground in London. Like Tschoegl and Sassen (2002) he dismisses the thesis of "the end of geography," such as that reflected in Kaufman (2001, pp. 375-376), that acceleration of advances in telecommunications and computer technology in recent years is likely to further reduce the need for physical and permanent IFSCs. Yet the communities and frequent contacts of top IFS professionals are increasingly virtual and global as many of them appear to be in perpetual motion and constantly connected for the benefit of clients. Furthermore, whether global financial system security, uninterrupted maintenance and development, and systems-failure management are better served by physical concentration or dispersion of IFS providers and (back-up) facilities, has rarely been considered.

Blommestein (2006) discerns two opposing tendencies at work. Having global communications available at negligible cost indeed has made some lines of the financial service business entirely footloose in that it has no attachment to place. Rather, where it happens to take place is dictated solely by current cost considerations, and there is little to inhibit rapid relocation. If a particular line of the financial business is subject to economies of scale in service production but also to diseconomies of distance (see Rose and Spiegel, 2005), the business could

tend to become more concentrated by location when distance costs fall. As Berger, DeYoung, and Udell (2001) point out, efficiency barriers to operating across borders may arise from distance, from differences in language, culture, currency, and regulatory/supervisory structures, and from explicit and implicit rules against foreign competitors. If any of these efficiency barriers to the export of financial services diminish, remote locations can be serviced 24 hours a day at lower cost from a given center. Yet traditional financial centers may not benefit. Rather, centers designed to perform low value-added financial services, such as routine billing and accounting services, may increasingly be established in, and dispersed over, new locations. In the United States, for instance, such centers of activity may shift from New York City to South Dakota and to hard-pressed cities such as Buffalo and then be dispersed over Central American and Asian locations.

On the other hand, high-value added financial services have to address increasingly complex and long-horizon financial management tasks in close and intimate collaboration with clients. These clients require frequent personal, often face-to-face, contacts and almost instant availability through global communications at all times. They may also expect prompt execution and settlement during local business hours and under their national legal and accounting system even though universal rules, standards, and protocols increasingly may apply. Hence footloose international financial services and sticky such services, that cling to their established relationship with IFSCs and their individually distinctive clients, will co-exist.

Blommestein's (2006) main thesis is that the product-driven financial supermarket model and the bancassurance model of providing full in-house service both need to be revised. Instead, a relationship-cum-market-based banking and finance system is emerging in which specialized

financial engineering development and applications for clients and the integration of products and services from outside suppliers play a greater role than before.

Similarly PricewaterhouseCoopers (2005, p. 5) notes that many [financial] institutions will compete "to meet the demand for long-term savings products and for life-cycle wealth management services" with "the goal of building a long-lasting and multi-faceted relationship with the customer." The report (p. 6) anticipates that "rising competitive pressures will force institutions to differentiate themselves more aggressively, whether through their product mix, their market focus, or their branding proposition. Conglomerate structures will wear less well that competency-led ones. Cost efficiency will remain key: Expect a further acceleration in the outsourcing of non-core functions." Several contributions in Pastré, Jeffers, Blommestein, and de Pontbriand (2007) elaborate on these themes.

Hence two distinct strategies that are sustainable for developing competitive advantage, differentiation and cost efficiency, first identified by Porter (1985), are at work in reshaping the financial services industry. On the one hand, the search for cost efficiency leads to simplification and standardization, as through the use of index products and passive (computer-driven) screening techniques in asset management, to drive down cost (see Moles, 2006). Indeed, fragmentation of production is becoming almost as pronounced in IFS as it has been in manufacturing for some time. Yet on the other hand, particularly in private banking and in dealing with high net-worth individuals, fee-intensive differentiation through customization is the key to competitive success. Hence what keeps IFS, as a profit- and employment-generating value-added activity, tied to a particular location is a vexing, but unavoidable, question for any metropolis or country that seeks to keep or attract a substantial share of the world's IFS activity.

VII. Conclusion

There are some evolutionary trends that loosen and others that strengthen the ties of particular lines of IFS to location, depending on the level of sophistication of these lines of business. The protections previously provided by agglomeration effects and strong hysteresis in economic geography may be weakening: Electronic network groups and platforms, including proprietary networks and virtual "communities," may replace the benefits of physical togetherness and ease of interaction in one place. Yet policy and management responses to a loss of business by and from a particular location may be fierce. Economically this may give the appearance of downward inelasticity of supply of financial services in a particular location, especially if there are allocative inefficiencies that can be reduced under pressure to maintain competitiveness.

Given these diverging tendencies in a global competitive environment, what public/private strategies promise to be most profitable and sustainable for conducting ever-changing configurations of financial-business functions? Identifying and structuring the analytical models, tools and data to be used for a comprehensive competitiveness and business-outlook assessment could provide information that is critical to answering this question for a particular location. The present survey is designed to help structure such research by outlining some of the key locational, macroeconomic, and microeconomic perspectives -- and the attendant issues of measurement, analysis, and policy -- that have to be addressed.

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